zation with a boiled preparation of MS-2 serum provided resistance to subsequent infection with the MS-2 strain of HBV. Pilot studies by Purcell and his co-workers (personal communication) in several chimpanzees have shown that purified preparations of HBs Ag, although not infectious, do provide protection against subsequent inoculation with infectious serum. However, I would echo the call for caution raised by Zuckerman[17] concerning the use of such vaccines in humans before extensive testing in animals.

Although the recent advances in viral hepatitis are heartening, they also bring into sharper focus a new problem. The new tests for HAV, combined now with various tests for detection of HBV infection, have afforded substantiation of the claims that a high proportion of transfusion-association hepatitis is caused by as yet unidentified infectious agents, neither HAV nor HBV.[18,19] Feinstone and co-workers[20] recently studied 22 patients each of whom had an episode of transfusion-associated hepatitis negative for HBs Ag, HBc Ag and the respective antibodies to these antigens. Antibody response to HAV was measured by immune electron microscopy. None of the 22 patients developed serologic evidence of HAV infection. Whether such unidentified infectious agents are also important causes of hepatitis in human populations at large will require much study. Nevertheless, it is evident that the more is learned about viral hepatitis the more appears to remain unknown.

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Federal Support for Medical Schools

IN AN ARTICLE elsewhere in this issue, Dr. John E. Crowder considers the financing of medical education. Dr. Crowder briefly describes the current sources of support for the education and training of physicians, criticizes the findings of the Association of American Medical Colleges' (AAMC) Committee on Financing Medical Education and concludes that the shift of medical school funding from the private and local to the federal sector is at the heart of medical school problems. He proposes income contingent loans as a solution, particularly to increasing federal intervention into educational affairs. Attractive as the solution may appear, there are serious defects in this approach that become apparent in a closer examination of the complexity of the situation.

There is little question that since World War II, the federal government has provided substantial support for the educational, research and service activities of academic medical centers. Unfortunately, there is also little doubt that the federal government has become less and less a "passive contributor" and has sought more and

more "to shape both educational and fiscal policies of the nation's medical schools."

Federal funds were provided initially almost entirely for biomedical investigations. The success of the Office of Scientific Research and Development during wartime led the Congress to decide that improving our capabilities in preventing, diagnosing and treating disease by advancing knowledge in the biomedical sciences was in the public interest. To implement this decision, Congress subsequently enacted legislation to expand the scope of the National Institutes of Health (NIH). Appropriations for the NIH have increased from $46 million in fiscal year 1950 to $2 billion in fiscal year 1975. In keeping with our tradition that education and research should go hand in hand so that each could strengthen the other, the nation's academic medical centers became deeply involved in the expanding effort. In fiscal year 1974, medical schools expended $970 million for biomedical research and research training.

Although these funds have not directly supported the instruction and training of physicians, the increase in faculty size undertaken to meet the expanded biomedical research initiatives has greatly strengthened the milieu in which medical education is provided. However, the medical schools have become dependent on research grants for a part of the salary of their faculty members, many of them in tenured positions. The higher level of research activity has contributed to the financial problems of medical schools in another way. The funding agency never really covers the entire costs of the supported investigations and the institutions must devote a part of their own resources to the enterprise.

In 1963, the Congress finally reached a consensus that the federal government also had a role in the support of medical education. To a great extent, this decision was made in response to numerous studies that called for an expansion of medical school class size. There was a realization that given the magnitude of financing required, the necessary development of new schools and enlargement of existing schools would probably not take place without federal funds. The initial support for student assistance through loans and scholarships and matching construction funds was soon expanded to include grants for educational programs of the medical schools. Under the provisions of the Comprehensive Health Manpower Training Act of 1971, authorizations were provided for capitation grants of $2,500 per year per student to support educational programs in medical schools. Appropriations never reached the full authorization levels and the average capitation grant has never exceeded $2,000 per year. Eligibility for capitation grants required that the medical schools maintain the level of their general operating expenditures from other sources and increase their class size by five percent or ten students, whichever was greater. Expansion of class size has also been required for federal construction grants. Thus, the Congress has never provided unfettered contributions to the costs of medical education. It has always required the medical schools to carry out its mandates in return for support. The manpower bills which passed the House and Senate during the 93rd Congress without a resolution of differences in the legislation before adjournment and the bill recently passed by the House (H.R. 5546) increase the quid pro quos for capitation.

Federal funds also have an impact on the service programs of academic medical centers. In response to growing demands for the complex tertiary care provided by medical school faculties in teaching hospitals, the level of medical services provided by the academic medical centers has increased substantially. Income from professional fees earned by the faculty has become the fastest growing source of support for the centers during the past decade. As for all medical care, the federal share of reimbursement for the professional fees of the faculty and the costs of care in the teaching hospitals has risen sharply. Regulations related to reimbursement have had substantial effects on educational institutions. They have brought about changes in the nature of graduate medical education and slowed the introduction of advances flowing out of laboratory and clinical research into patient care.

It is clear that the Congress has seized upon the dependence of medical schools on federal funds to use them as convenient vehicles in confronting perceived problems it is unwilling or unable to deal with in a more direct manner. Although imposing onerous and intrusive conditions on the support of medical education through capitation grants is the most obvious route of federal intervention into medical school affairs, there are other programs through which the Congress can exert its will—the funding of biomedical research and the reimbursement of medical services through Medicare and Medicaid. There have been veiled

threats that these avenues will be used if medical schools refuse capitation grants because of the conditions required, and try to compensate for lost federal support by increasing tuition. In his valedictory speech, Caspar Weinberger, Secretary of Health, Education, and Welfare, recently warned of the "growing danger of all pervasive Federal Government." He laid most of the blame for "meddlesome" government to Capitol Hill. But overexuberant interpretation of statutory intent has brought excesses of authority for the federal agencies and they are out of or beyond control. The provisions incorporated in some legislation and the regulations that grow out of it give more and more reason for believing Richard Hofstadter's observation that reforming energies are easily "transmuted into mere peevishness."

If the federal government is involved in the capitalization of the income contingent loan program advocated by Dr. Crowder, it can restrict loans to students attending schools that meet criteria laid down by the Congress. The Rogers Bill (H.R. 5546) that has just passed the House does just this. The "capitation" funds supplied to a medical school must be repaid by the students after graduation, either in money or in service. The federal government will pay what amounts to additional tuition directly to the school under certain conditions and collect it later from the student. It is, in essence, an interest free loan which is available only to those who attend medical schools that agree to either increase their class size or carry out a substantial part of their clinical education and training in remote sites. There is little indication that given its present philosophy, the Congress would provide funds for support of medical education through any mechanism without attempting to use its leverage on the medical schools to carry out what it perceives to be the public purpose. The state governments are also beginning to attach equally intrusive requirements to the support they provide for both the publicly controlled and private medical schools.

There is little likelihood that the private sector would be able to provide the amount of funds needed to capitalize an income contingent loan program. The participation of commercial banks in the guaranteed student loan programs evidences a serious reluctance to invest in long-term loans with low interest return. The prospects of continuing high inflation rates makes such loans even less attractive to the banks. Inflation also makes it unlikely that the program could ever be fully capitalized to become a revolving loan fund.

If an income contingent loan program is not the solution, where do the answers lie to our current dilemma? The options are limited. Increasing tuition to cover the full costs will price medical education out of reach of all but the wealthy and halt efforts to broaden the socioeconomic levels of entering classes. There is little evidence that unrestricted gifts and grants from physicians, industry and foundations can be increased to the level required to eliminate dependence on government support. Other internal sources of support, such as income from the medical practice of the faculty, cannot be increased without producing severe distortions in the form and function of institutions. Reducing expenditures by sharp cutbacks in faculty and supporting services would have a serious impact on the quality of educational programs.

The current level of informed public debate has not permitted a thoughtful and objective assessment of the problems facing the nation's medical schools and the short-term and long-term implications of the outside pressures being exerted on the institutions by their financing sources. Until this occurs and those with the necessary leverage resolve the problems of accessibility and costs of health care, medical schools in the United States will face continuing difficulty in retaining the traditional freedoms of academic institutions which are critical to maintaining the excellence of their educational programs and their other contributions to improving health.

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